

CLAIMS

1. A multi-step transmission in planetary style, in particular an automatic transmission for a motor vehicle, comprising an input shaft (1) and an output shaft (2), which are arranged in a housing (G), three spider supported planetary gear sets (P1, P2, P3), at least seven rotatable shafts (1, 2, 3, 4, 5, 6, 7), as well as at least six switch elements (03, 04, 05, 14, 56, 67), brakes and clutches, whose selective meshing effects different gear ratios between the input shaft (1) and the output shaft (2), so that seven forward gears and one reverse gear can be realized, wherein input occurs by means of the shaft (1), which is in permanent connection with an element of the first planetary gear set (P1); output occurs via a shaft (2), which is permanent connection with the planet carrier of the second planetary gear set (P2) and the planet carrier of the third planetary gear set (P3); a shaft (3) is in permanent connection with a further element of the first planetary gear set (P1); a shaft (4) is in permanent connection with the ring gear of the second planetary gear set (P2) and the ring gear of the third planetary gear set (P3); a shaft (5) is in permanent connection with the sun gear of the third planetary gear set (P3); a shaft (6) is in permanent connection with the ring gear of the first planetary gear set (P1); a shaft (7) is connected to the sun gear of the second planetary gear set (P2); the shaft (3) can be coupled to the housing (G) by means of the brake (05); the shaft (4) can be coupled to the housing (G) by means of a brake (04); the shaft (5) can be coupled to the housing (G) by means of a brake (05); a clutch (14) detachably connects the shaft (1) and the shaft (4) to each other; a clutch (56) detachably connects the shaft (5) and the shaft (6) to each other; and a clutch (67) detachably connects the shaft (6) and the shaft (7) to each other.

2. The multi-step transmission of claim 1, wherein the shaft (1) is in permanent connection with the planet carrier of the first planetary gear set (P1), and the shaft (3) is in permanent connection with the sun gear of the first planetary gear set (P1).

3. The multi-step transmission of claim 1, wherein the shaft (1) is in permanent connection with the sun gear of the first planetary gear set (P1), and the shaft (3) is in permanent connection with the planet carrier of the first planetary gear set (P1).

4. The multi-step transmission of one of the claims 1 through 3, wherein the first planetary gear set (P1) and the third planetary gear set (P3) are configured as a plus planetary gear set, and the second planetary gear set (P2) is configured as a minus planetary gear set.

5. The multi-step transmission of claim 4, wherein the second planetary gear set (P2) and the third planetary gear set (P3) are combined as a Ravigneaux planetary gear set with a common planet carrier and a common ring gear.

6. The multi-step transmission of one of the preceding claims, wherein additional free wheels can be used in every suitable location.

7. The multi-step transmission of claim 6, wherein free wheels are provided between the shafts (1, 2, 3, 4, 5, 6, 7) and the housing (G).

8. The multi-step transmission of one of the preceding claims, wherein the input and output are provided on the same side of the housing.

9. The multi-step transmission of one of the preceding claims, wherein an axle differential and/or inter-axle differential is arranged on the input side or on the output side.

10. The multi-step transmission of one of the preceding claims, wherein the input shaft (1) can be separated from a driving motor by means of a coupling element.

11. The multi-step transmission of claim 10, wherein a hydrodynamic converter, a hydraulic clutch, a dry starting clutch, a wet starting clutch, a magnetic power clutch, or a centrifugal clutch is provided as coupling element.

12. The multi-step transmission of one of the preceding claims, wherein an external starting element in particular pursuant to claim 10 can be arranged behind the transmission in the direction of power flow, while the input shaft (1) is fixedly connected to the crankshaft of the engine.

13. The multi-step transmission of one of the preceding claims, wherein starting occurs by means of a switch element of the transmission, while the input shaft (1) is in permanent connection with the crankshaft of the engine.
14. The multi-step transmission of claim 13, wherein the brake (03) or the brake (04) can be used as switch element.
15. The multi-step transmission of one of the preceding claims, wherein a torsional vibration damper can be arranged between the engine and the transmission.
16. The multi-step transmission of one of the preceding claims, wherein a wear-free brake can be arranged on each shaft.
17. The multi-step transmission of one of the preceding claims, wherein an auxiliary drive can be arranged on each shaft in order to drive the additional units.
18. The multi-step transmission of claim 17, wherein the auxiliary drive can be arranged on the input shaft (1) or on the output shaft (2).
19. The multi-step transmission of one of the preceding claims, wherein the switch elements are configured as power-shift clutches or brakes.
20. The multi-step transmission of claim 19, wherein multi-plate clutches, band brakes, and/or cone clutches can be used.
21. The multi-step transmission of one of the claims 1 through 18, wherein positive locking brakes and/or clutches are provided as switch elements.
22. The multi-step transmission of one of the preceding claims, wherein an electric machine can be accommodated on each shaft as generator and/or as auxiliary driving machine.